

Phase Behavior and BPIII-I Critical Point in (R)/(S) Mixtures of a Chiral Liquid Crystal with a Direct TGB to BP Transition

P. Jamée,¹ G. Pitsi,¹ M.-H. Li,² H.-T. Nguyen,³ G. Sigaud,³ and J. Thoen¹

¹*Laboratorium voor Akoestiek en Thermische Fysica*

Departement Natuurkunde

K.U.Leuven

Celestijnenlaan 200D

3001 Leuven, Belgium

²*Section de Physique et de Chimie*

Institut Curie

11 Rue Curie, 75231 Paris

³*Centre de Recherche Paul Pascal*

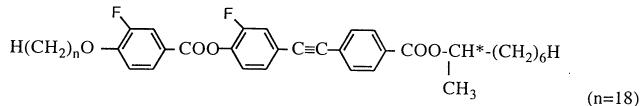
CNRS

Université de Bordeaux I

Av. A. Schweitzer

33600 Pessac Cedex, France

We have investigated mixtures of the (R) and (S) enantiomers of the chiral tolane derivative (R) or (S)-1-methylheptyl 3'-fluoro-4'-(3-fluoro-4-octadecyloxybenzoyloxy) tolane-4-carboxylate, abbreviated as FH/FH/H18BTMHC, using high resolution adiabatic scanning calorimetry (ASC) [1].



This compound exhibits a direct twist grain boundary. A (TGB_A) to blue phase (BPI) transition without an intermediary chiral nematic N* phase. The ASC technique can perform a direct measurement of the enthalpy as a function of temperature thus is able to determine latent heat of a first order transition.

By changing the enantiomeric excess we can affect the effective chirality of these mixtures. In this way a phase diagram as a function of enantiomeric excess is obtained. This diagram is different from what is known for other systems in literature [2], probably due to the presence of a TGB instead of a N* phase below the blue phases. Furthermore, a BPIII-I critical point is observed [3,4]. We will demonstrate the evolution from a supercritical BPIII-I heat capacity anomaly in the pure (R) enantiomer to a first order transition at lower enantiomeric excess. The influence of the changing enantiomeric excess on the latent heats for all first-order transitions will also be discussed in detail.

- [1] M. Young, G. Pitsi, M.H. Li, H.T. Nguyen, P. Jamée, G. Sigaud, and J. Thoen, *Liq. Cryst.* **25**, 387 (1998).
- [2] Z. Kutnjak, C.W. Garland, C.G. Schatz, P.J. Collings, C.J. Booth, and J.W. Goodby, *Phys. Rev. E* **53**, 4955 (1996).
- [3] T.C. Lubensky and H. Stark, *Phys. Rev E* **53**, 714 (1996).
- [4] M.A. Anisimow, V. A. Ayagan and P. J. Collings, *Phys. Rev.* **57**, 582 (1998).